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BRIEFER ARTICLES.

A NEW SPECIES OF GEASTER.

(WITH TWO FIGURES)

IN February 1903, I received through Dr. W. C. Coker, of the University of North Carolina, Chapel Hill, N. C., a pretty little Geaster, growing on the bark of moss-covered living trunks of trees in the woods. The first specimens which I received were collected by one of the students at the University, Mr. C. A. Shore, and afterwards very abundant material was collected both by Mr. Shore and Dr. Coker.

The species is quite remarkable in several respects. In the first place, its habitat on bark of living trees is unusual, for while now and then a species normally growing on the ground or on dead logs may be found around the bases of trees on the dead bark among moss, the distinctive habit of this species is upon the dead bark of living trees some distance from the ground. In this respect it is similar to the puff ball, *Lycoperdon leprosum* B. & R.¹ In fact, it sometimes grows intermingled with specimens of *Lycoperdon leprosum* on the same tree, so it may occur as an associate, or as the only puff ball on the tree. Thus far it has always been found among moss, and it will be interesting to know if there is any mutualism between the moss and its associate Geaster, of such a nature that the Geaster is dependent upon the moss, or whether the conditions of moisture, etc., which are favorable for the growth of the Geaster in all cases observed, bring about also the development of the moss, so that the association of the two is merely accidental.

It is also remarkable in another respect, that it belongs to the fornicate section of the genus, a section which contains but a very few species in comparison with the large number known. The third unusual character of the species is that the spores are smooth, not echinulate or tuberculate, as in other species, although the spores are more or less irregular, with three to four slight angles in side view. Usually these angles are not prominent, and under the low power of the microscope the spores appear to be perfectly globose. At first

¹ *Lycoperdon leprosum* B. & R., Rav. Fung. Am. Ex. no. 14. See also Pk. Mon. Lycop. 29.

I thought the spores were white, and they are colorless in specimens which are not very mature, but when the plant is quite mature, the inner peridium well opened and more or less collapsed, the spores mostly have a pale yellowish-brown color. The plant is attached to the moss and the bark by numerous threads, which radiate irregularly from the outer cup-shaped layer of the outer peridium, and the mycelium extends also into the dead bark, penetrating more clearly through the lines of cleavage in the bark, both radial and tangential.



FIG. 1.—*Geaster leptospermus*. Smaller plants, upper right hand corner, natural size. Others $\times 2.5$, the one at the left collapsed and broken away from cuplike base, which is also collapsed, but is shown as a well formed and distinct layer. Plant at extreme right in early stage of dehiscence; outer peridium split into 4 rays.

In some cases delicate rhizomorphic strands are developed quite abundantly in the tangential cleavage planes. The plants are whitish, but when mature pale gray in color. They are oval to globose, 3–4.5^{mm} in diameter. Before the dehiscence of the outer peridium takes place, the plants are inconspicuous and appear as minute rounded bodies, or minute convex whitish surfaces in the moss. But after dehiscence takes place the fornicate character of the plant lifts the inner peridium so far above the moss that it is quite conspicuous, except for its minute size. When dehiscence of the outer peridium first takes place it splits radially into three or four rays, showing the white granular surface of the inner peridium, with its well defined mouth, which is radiately silky, but not sulcate nor striate. The inner face of the outer peridium is also seen to be granular. As the plant expands more the inner layer of the outer peridium separates from the outer

layer and is everted, the points of the rays remaining attached to the points of the outer cup-shaped layer. The inner peridium is globose and borne aloft as usual. When fully expanded the inner surface of the outer peridium has a white or flesh colored tinge, and under the lens is minutely granular. The inner peridium and area about the mouth is white, while the other portion is whitish or pale lead color. By the time the perforation appears at the center of the mouth the inner peridium is $2.5-3.5^{\text{mm}}$ in diameter and is sessile or only very slightly pedicellate.

The cup-shaped outer layer of the outer peridium is quite distinct and well formed, although it is quite firmly attached to the moss and bark and is very thin, the margin of course being split into a number of rays corresponding to the rays of the inner layer.

At my request Mr. J. M. Van Hook, assistant in the botanical department, photographed the plant, one photograph being taken with the plant enlarged two and one-half times to show more of the detail, while another photograph was taken natural size (*fig. 1*). The cup-shaped outer layer of the outer peridium, while intact, does not show very well in the photograph, because, being almost completely immersed in the moss, it could not be sufficiently lighted and brought into focus, though in one of the individuals, which was more or less removed from the moss, the outer layer being torn apart shows more distinctly.

The capillitium is white or pale yellowish, or pale yellowish-brown. It extends from the inner surface of the inner peridium toward the center. The threads are nearly straight, or very flexuous and irregular, the larger and more irregular ones being nearer the peridium. The threads are often flexuous and branched, but are sometimes unbranched for long distances. Their surface is smooth, except that it is often very irregular and more or less corrugated. They vary in diameter from $2-6\mu$. The spores are very minute, $1.5-2.5\mu$ in diameter, white or very pale yellowish-brown, not echinulate nor tuberculate, many of them showing that they are more or less irregular and sometimes rather strongly angular.

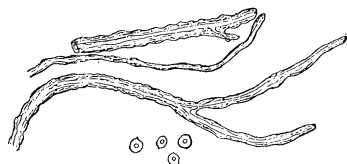


FIG. 2.—Spores and threads of capillitium of *Geaster leptospermus*.

Dr. Coker has furnished me with an interesting note concerning the habitat and collection of the plant, which I append here:

"The plant was first found (a single specimen) by Mr. C. A. Shore, on the trunk of a cedar tree (*Juniperus virginiana*), growing with moss. Since that time I have found it repeatedly (as has also Mr. Shore) sometimes in large numbers (a score or more), and always on the trunks of trees growing with moss. It often occurs in association with *Lycoperdon leprosum* as the same situation is affected by both. The Geaster never grows in close clusters, but the individuals are scattered here and there at varying distances. It seems to grow indifferently on almost any tree where moisture conditions are favorable. I have found it on Ulmus, Hicoria and Juniperus. The mycelium penetrates the old bark and extends itself abundantly between the planes of cleavage."

The species may be described as follows:

Geaster leptospermus Atkinson & Coker, n. sp. Plants occurring singly or gregarious, oval to globose. Peridium 3-4.5 μ in diameter, outer layer closely attached to the moss and bark of the tree by numerous mycelial threads. Outer peridium splitting radially into 3-4 rays, its inner and outer layer then separated by a plane of cleavage, the inner layer being everted, leaving the outer layer in the form of a thin membranous cup with a stellate margin, points of the inner layer remaining attached to the points of the rays of the outer layer, its inner face minutely granular, white or with a flesh colored tinge. Inner peridium sessile or only very slightly pedicellate, 2.5-3.5 μ in diameter, globose and borne aloft by the eversion of the inner layer of the outer peridium, as in other fornicate species of the genus; mouth well defined, not sulcate nor striate, but marked by distinctly radiate silky threads, opening at maturity by a minute perforation; surface whitish or pale lead color, the area about the mouth white. Capillitium abundant, whitish or pale yellowish-brown, extending from the inner surface of the inner peridium towards the center; threads straight or very flexuous and irregular, simple or sometimes branched, 2-6 μ in diameter. Spores very minute, 1.5-2.5 μ in diameter, white or pale yellowish-brown, smooth, that is, not tuberculate nor echinulate, but often irregular and sometimes rather strongly angled, 3-4 angles in side view.

On moss covered dead bark of living trees (*Juniperus virginiana* Hicoria, Ulmus, etc.), woods, Chapel Hill, N. C.—GEORGE F. ATKINSON, *Cornell University, Ithaca, N. Y.*

TILLETIA IN THE CAPSULE OF BRYOPHYTES.

It has been known for several years that the capsules of certain mosses and liverworts are sometimes attacked by fungous parasites that